REMARKS

Original claims 1-99 are pending in the application.

Interview Summary

The undersigned attorney thanks the Examiners for the telephone interview granted on May 4, 2006. During the interview, the undersigned attorney and Vincent M. Keil, Reg. No. 36,838, discussed the final Office action mailed March 21, 2006 with Examiners Eric B. Chen and Nadine G. Norton.

In particular, the parties discussed the merits of the continued rejection of claim 1 under 35 U.S.C. §102(b) as anticipated by the disclosure in U.S. Publication No. 2001/0003672 A1 (Inoue et al.). The undersigned attorney pointed out again that contrary to the assertion in paragraph 3 of the final Office action (repeated *ver batim* from the Office action mailed November 16, 2005), Inoue et al. fail to disclose any embodiment of a caustic etchant as called for in the silicon wafer etching process defined in claim 1. In particular, neither paragraphs [0015], [0030] and [0049] of Inoue et al. cited in the final Office action, nor any of the working examples disclose a caustic etchant of the composition utilized in the process of claim 1. Examiner Norton indicated the §102(b) rejection of claim 1 would be reconsidered in light of these shortcomings in the disclosure of Inoue et al., in particular the lack of any working examples or other specific disclosure in the cited reference describing a caustic etchant that satisfies the compositional limitations of claim 1 including a water concentration of less than 45% by weight.

Examiner Norton invited applicants to present arguments for the patentability of claim 1 over Inoue et al., including

evidence of unexpected results. However, the attorneys for the applicants noted that such a showing is not required absent the Office first establishing a *prima facie* case of obviousness with respect to claim 1 based on the disclosure in Inoue et al. As set forth below, such a *prima facie* case of obvious cannot be made and a showing of unexpected results is not required.

Examiner Norton indicated that the Office might also reconsider the allowance of claims 33-81 and the indication of allowable subject matter in claims 7-16, 22, 88, and 90. For the reasons set forth below and as already acknowledged by the Office on the record, applicants respectfully submit that the allowed and allowable claims are patentable over the art of record.

Rejection Under 35 U.S.C. §102

Reconsideration is requested of the rejection of claims 1-6, 17-21 and 26-28 under 35 U.S.C. §102(b) as anticipated by the disclosure in U.S. Publication No. 2001/0003672 A1 (Inoue et al.).

Applicants respectfully submit that claims 1-6, 17-21, and 26-28 are novel and patentable over the disclosure of Inoue et al. for the reasons set forth in applicants' Letter filed February 13, 2006 in response to the Office action mailed November 16, 2005. In particular, the disclosure of Inoue et al. of polishing compositions comprising water, an abrasive and one or more various candidate additives, and their general and preferred concentration ranges fails to teach a single embodiment of a caustic etchant in the form of an aqueous solution comprising water and a source of hydroxide ions in

which the concentration of water in the caustic etchant is less than 45% by weight as required in the process of claim 1.

The attempted reliance on the decision in *Titanium Metals Corp. v. Banner* in paragraph 56 of the final Office action is misplaced due to the Office's continued mischaracterization of the disclosure in Inoue et al. Contrary to the implication in the final Office action, paragraphs [0030] and [0049] of Inoue et al. do not disclose a caustic etchant comprising 50% by weight abrasive, 30% by weight alkali metal hydroxide and therefore 20% by weight water. Rather, this general disclosure in Inoue et al. is that the concentration of the abrasive in the polishing solution can vary from 0.01 to 50 wt%, while the concentration of alkali metal hydroxide can **independently** vary from 0.001 to 30 wt% with no teaching or suggestion that a high abrasive content be combined with a high concentration of alkali metal hydroxide or other source of hydroxide ions to thereby necessarily obtain a caustic etchant having a water content of less than 45% by weight. Unlike the situation in *Titanium Metals Corp. v. Banner*, the disclosure in Inoue et al. is devoid of a specific example or "actual data point" corresponding to an etchant meeting the compositional requirements of claim 1.

Applicants challenge the Office to cite a passage or working example of Inoue et al. disclosing a caustic etchant as defined in claim 1 including a water concentration of less than 45% by weight. In the absence of such disclosure, withdrawal of the rejection of claims 1-6, 17-21, and 26-28 under 35 U.S.C §102(b) is again respectfully requested.

The final Office action does not raise an alternative rejection of the subject matter of claims 1-6, 17-21 and 26-28 for obviousness under 35 U.S.C. §103(a) in view of Inoue et al.

Nevertheless, in light of the comments made by Examiner Norton during the telephone interview and in order to expedite prosecution and allowance of this application, applicants submit that the disclosure in Inoue et al. does not establish a *prima facie* case of obviousness with respect to the claimed invention.

In order to establish a *prima* facie case of obviousness, the Patent Office must establish, *inter alia*, that there is some suggestion or motivation to modify the reference and that the reference teaches or suggests all the claim limitations (See MPEP §2143).

The broad disclosure of a polishing composition comprising water, 0.01 to 50 wt% abrasive, and 0.001 to 30 wt% of an alkali metal hydroxide erroneously relied on to reject claim 1 under 35 U.S.C. §102(b) clearly fails to teach or suggest a caustic etchant as defined in claim 1 in which the concentration of water is less than 45% by weight. The cited disclosure in Inoue et al. does not teach a caustic etchant having a water concentration of 20% by weight as asserted in the final Office action any more than it teaches an etchant comprising 0.01% by weight abrasive, 0.001% by weight alkali metal hydroxide and therefore 99.989% by weight water.

While Inoue et al. disclose polishing compositions in Examples 1-6, 9-13 and 16-30 (reported in Tables 1 and 2) including water, an abrasive and a source of hydroxide ions (KOH, NaOH or tetramethylammonium hydroxide (TMAH) 3.6% solution), this disclosure likewise fails to teach or suggest the caustic etchant used in the process of claim 1 having a water content of less than 45% by weight. For example, the polishing composition of Example 16 includes water, colloidal silica (50 g/liter), potassium hydroxide (0.5 g/liter), and hydroxyethyl cellulose

(5.0 g/liter). Similarly, the polishing composition of Example 20 includes water, colloidal silica (50 g/liter), TMAH (~0.72 g/liter), and hydroxyethylcellulose (5.0 g/liter). The concentration of water in these polishing compositions is approximately 94% by weight. In view of the compositional details provided in Tables 1 and 2, the water concentration in each of the other listed polishing compositions is roughly equivalent to that in Examples 16 and 20 or even greater and in any event greatly exceeds 45% by weight.

In view of the above, applicants request favorable reconsideration of the rejection of claims 1-6, 17-21 and 26-28 under 35 U.S.C §102(b) and submit that the invention defined in these claims is patentable over the disclosure in Inoue et al.

Rejections Under 35 U.S.C. §103(a)

Claims 23-25 and 29-32

Reconsideration is requested of the rejection of dependent claims 23-25 and 29 under 35 U.S.C. §103(a) based on the disclosure of Inoue et al. in view of the disclosure in U.S. Patent No. 6,099,748 (Netsu et al.).

Reconsideration is also requested of the rejection of dependent claims 30-32 under 35 U.S.C. §103(a) based on the disclosure of Inoue et al. in view of the disclosure in U.S. Patent No. 6,793,836 (Tsung-Kuei et al.).

Applicants respectfully submit these proposed combinations of references fail to establish a *prima facie* case of obviousness with respect to the claimed subject matter for the reasons set forth above concerning the deficiencies of the disclosure in the primary reference, Inoue et al., with respect

to claim 1 from which these claims depend as well as for the additional limitations set forth in these claims.

Claims 82-87, 89, and 91-99

Reconsideration is requested of the rejection of claims 82-87, 89, and 91-99 under 35 U.S.C. §103(a) based on the disclosure of Inoue et al. Applicants maintain that the disclosure of Inoue et al. fails to establish a *prima facie* case of obviousness with respect to these claims.

The processes of independent claims 82 and 99 utilize a caustic etchant comprising water, hydroxide ions and a salt additive selected from the group consisting of inorganic alkali and alkaline earth metal salts and mixtures thereof. In the process of claim 82, the salt additive comprises a compound selected from the group consisting of inorganic alkali and alkaline earth metal salts and mixtures thereof and the concentration of the salt additive in the caustic etchant is at least about 4 mole percent. In the process of claim 99, the salt additive comprises a compound selected from the group consisting of potassium carbonate and potassium fluoride and the concentration of the salt additive in the caustic etchant is at least about 1 mole percent.

The various candidate additives for inclusion in the polishing and surface treating compositions of Inoue et al. include (1) alkali metal hydroxides; (2) alkali metal carbonates; (3) alkali metal hydrogencarbonates; (4) quaternary ammonium salts; (5) peroxides; and (6) peroxo acid salts (See paragraphs [0015] and [0022] to [0028]). Applicants acknowledge that this list of candidate additives includes both alkali metal carbonate salts (such as potassium carbonate and sodium carbonate) and hydroxide

ion sources (such as alkali metal hydroxides and quaternary ammonium hydroxide salts) and that the cited reference teaches generally that these additives may be used in combination (See paragraph [0029]). However, the vast majority of the disclosure in Inoue et al. does not contemplate the use of more than one of the disclosed additives, nor are any specific combinations of the disclosed additives taught or suggested. Among the myriad of possible combinations of the six different types of optional additives alluded to generally by Inoue et al. (including numerous combinations that would not contain a source of hydroxide ions and/or an alkali metal carbonate), the cited reference fails to teach or suggest the specific combination of a hydroxide ion source additive with an alkali metal carbonate additive in accordance with the process of claims 82 and 99. None of the polishing compositions described in the 30 Examples of Inoue et al. include the combination of a hydroxide ion source additive with an inorganic alkali or alkaline earth metal salt. In the two Examples that include potassium carbonate as an additive in the polishing composition (Examples 7 and 8), the polishing composition does not include hydroxide ions or, for that matter, any of the other additives disclosed by Inoue et al.

In addition to providing no teaching or suggestion that would motivate one skilled in the art to select the specific combination of an alkali metal carbonate and hydroxide ion source additives, Inoue et al. fail to teach or suggest making such a combination in an etchant along with an abrasive (in polishing compositions), other optional additives and water in such proportions so as to obtain a caustic etchant containing the minimum salt additive content recited in claim 82 (at least

about 4 mole percent of the inorganic alkali metal salt) or claim 99 (at least about 1 mole percent of potassium carbonate). In paragraphs 29 and 45 of the final Office action (copied *ver batim* from the Office action mailed November 16, 2005), the Office inexplicably combines the disclosure in Inoue et al. of an additive content from 0.001 to 50 wt% generally applicable to all six of the candidate additives (See paragraph [0029]), with the separate specific disclosure pertaining to the situation "when **the** additive is an alkali metal hydroxide, carbonate **or** hydrogencarbonate" the concentration of the additive is from 0.001 to 30 wt% (See paragraph [0030]) and then subtracts the upper end (30%) of the latter disclosed range from the upper end (50%) of the general range to arrive at a potassium carbonate content of 20% by weight. As emphasized in the above-quoted disclosure in paragraph [0030] of Inoue et al., the concentration range of from 0.001 to 30 wt% pertains to a **single** additive selected from alkali metal hydroxide, carbonate or hydrogencarbonate and does not teach or suggest the composition purported in the Office action including both sodium hydroxide and potassium carbonate. Inoue et al. contains no teaching whatsoever of an etchant containing the combination of a hydroxide ion source and an inorganic alkali or an alkaline earth metal salt additive in such proportions with water so as to obtain the minimum salt additive concentration recited in either claim 82 or 99.

In view of the above, applicants respectfully submit the disclosure of Inoue et al. fails to establish a *prima facie* case for obviousness of the processes defined in either claim 82 or claim 99. The processes defined in dependent claims 83-87, 89 and 91-98, which depend directly or indirectly from claim 82,

are likewise submitted as patentable over Inoue et al. for the reasons set forth above with respect to claim 82 and the additional limitations set forth therein.

Allowed and Allowable Subject Matter

Applicants acknowledge the allowance of claims 33-81.

During the telephone interview, Examiner Norton indicated possible reconsideration of the allowed subject matter. Initially, applicants note that great care should be exercised by the Office in rejecting claims that have been previously held to be allowable (See MPEP §706.04 and §1308.01).

Each of the allowed claims is directed to a process for removing silicon from the surface of a silicon wafer utilizing a caustic etchant in the form of an aqueous solution comprising water and a source of hydroxide ions. In the process of claims 33-62, the concentration of the source of hydroxide ions in the caustic etchant is greater than 55% by weight; in the process of claims 63-81, the concentration of the source of hydroxide ions in the caustic etchant is at least about 70% of the saturation concentration of the source of hydroxide ions in the caustic etchant. Applicants respectfully submit that no reference of record teaches or suggests a caustic etching process as defined in any of these claims and that the allowed subject matter is patentable over the art of record for the reasons already acknowledged by the Office. In particular, as acknowledged by the Office in paragraphs 48, 52 and 53 of the final Office action, the art of record, including Inoue et al. and U.S. Patent No. 6,099,748 (Netsu et al.), provides no motivation or suggestion for the concentration of the source of hydroxide ions in the caustic etchant to exceed 55% by weight (claim 33) or

that the concentration of the source of hydroxide ions in the caustic etchant is at least about 70% of the saturation concentration of the source of hydroxide ions in the caustic etchant (claim 63).[1]

Applicants further acknowledge the indication of allowable subject matter in dependent claims 7-16, 22, 88 and 90. Applicants respectfully submit these claims are patentable over the art of record for the reasons already acknowledged by the Office in paragraphs 48 to 50 of the final Office action.

If the Office is now of a different view with respect to the subject matter defined in allowed claims 33-81 and indicated as allowable in claims 7-16, 22, 88 and 90, applicants respectfully request that such reasoning be expressed on the record so that a proper response can be made.

Favorable reconsideration and allowance of all pending claims are respectfully solicited. Applicants do not believe any fees are due with the timely submission of this Letter.

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[1] In order to clarify the prosecution record, applicants note that the observations in paragraph 53 of the final Office action are incorrect. Particularly, that a caustic etchant containing sodium hydroxide at 70% of the saturation concentration of the hydroxide source in the caustic etchant does not equate to a caustic etchant containing sodium hydroxide at a concentration of 77% by weight. The saturation concentration of sodium hydroxide in an aqueous solution at 20°C is approximately 52% by weight (i.e., 111 g of sodium hydroxide per 100 g water or 111 g/211 g). Nevertheless, saturation concentration of the source of hydroxide ions is temperature dependent and Netsu et al. fail to disclose or suggest the process of claim 63 in which the concentration of the source of hydroxide ions in the caustic etchant contacted with the surface of the silicon wafer is at least about 70% of the saturation concentration of the source of hydroxide ions in the caustic etchant during the etching process.

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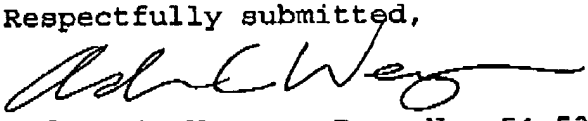
However, the Commissioner is requested to charge any fee deficiency in connection with this Letter to Deposit Account No. 19-1345.

Respectfully submitted,



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